



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,631	03/30/2004	Nassir Navab	2003P05012 US01	3464

7590 12/12/2005  
Siemens Corporation  
Intellectual Property Department  
170 Wood Avenue South  
Iselin, NJ 08830

EXAMINER
----------

ARTMAN, THOMAS R

ART UNIT	PAPER NUMBER
----------	--------------

2882

DATE MAILED: 12/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	Application No. 10/812,631	Applicant(s) NAVAB ET AL.	
	Examiner Thomas R. Artman	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-23 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>23 September 2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the drawings appear to be some sort of colored or gray-scale image, such as from PowerPoint or similar software. Because of the scanning of all documents into IFW, the image quality of such drawings becomes so poor as to render the images unintelligible. The examiner suggests replacement drawings in pure black/white images such that the image quality will be improved upon scanning into the record. Applicants can view the images in the USPTO PAIR online system in order to see what the drawings look like. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-5 and 7-23 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for X-rays, does not reasonably provide enablement for “electromagnetic rays.” The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims. “Electromagnetic rays” encompass the entire

Art Unit: 2882

electromagnetic spectrum, which includes X-rays and gamma rays, as well as UV, visible light, microwaves and radio waves, for example, listed in order of decreasing energy. The specification is enabled only in the context of X-ray imaging/treatment systems that use X-ray/gamma-ray sources and detectors. The claims could read on a variety of non-X-ray devices, such as optical interferometers with beam splitters, using either one or multiple wavelengths, etc. The specification is not enabled for such a broad scope.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 5-9, 11-16 and 18-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Ogura (US 6,731,718 B2).

Regarding claim 5, Ogura discloses an apparatus (Fig.38), including:

- a) a source of excitation light 84,
- b) an electromagnetic ray source 80 disposed relative to the source of excitation light,
- c) an electromagnetic ray transparent mirror 81 having a first surface disposed toward the light source and second surface disposed toward the electromagnetic ray source,

d) a target location disposed towards the first surface of the electromagnetic ray transparent mirror for locating a target S and receiving the excitation light and the electromagnetic rays,

e) an electromagnetic ray detector 87 disposed on an opposite side of the target location relative to the electromagnetic ray transparent mirror for detecting electromagnetic rays transmitted through the target,

f) a second electromagnetic ray transparent mirror 81 having a light reflective surface disposed towards the target location, and

g) a light detector 88 disposed towards the light reflective surface of the second electromagnetic ray transparent mirror for detecting light from the target.

With respect to claim 6, Ogura further discloses that the electromagnetic ray source emits X-rays.

With respect to claim 7, Ogura further discloses that the source of excitation light emits optical or coherent light (visible or infrared, col.18, lines 43-48).

With respect to claim 8, Ogura further discloses that the light detector detects transmitted light from the detector (Fig.38).

With respect to claim 9, Ogura further discloses that there is a mirror 81 disposed towards the excitation light for at least one of reflecting and redirecting the excitation light.

Art Unit: 2882

With respect to claim 11, Ogura further discloses that the apparatus is rotated around a patient.

Rgarding claims 12 and 18, Ogura discloses a method and program (Figs.38 and 45), including:

- a) defining a frame of reference,
  - b) providing electromagnetic rays to a target S relative to the frame of reference (via source 80, 100),
  - c) detecting electromagnetic rays transmitted by the target relative to the frame of reference (via detector 81, 104),
  - d) detecting light from the target relative to the frame of reference (via detector 88, 106),
- and
- e) providing co-registered electromagnetic ray and light images of the target to a user (col.17, lines 30-52; col.19, line 35 through col.21, line 23).

With respect to claims 13 and 19, Ogura further discloses the step of redirecting the light to be detected from the target without redirecting the electromagnetic to be detected from the target (via X-ray transparent mirror 101).

With respect to claims 14 and 20, Ogura further discloses the step of providing excitation light to the target relative to the frame of reference (ambient light in the examination room from room lights, also item 84).

With respect to claims 15 and 21, Ogura further discloses the step of redirecting the excitation light relative to the target without redirecting the electromagnetic rays (via X-ray transparent mirror 81).

With respect to claims 16 and 22, Ogura further discloses the step of capturing X-ray image data and identifying X-ray image data associated with the target (by way of X-ray detector 81, 104).

Claims 12-16 and 18-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Asahina (US 5,539,798).

Rgarding claims 12 and 18, Asahina discloses a method and program (Figs.1, 2 and 16), including:

- a) defining a frame of reference,
- b) providing electromagnetic rays to a target P relative to the frame of reference (via source 2, 11),
- c) detecting electromagnetic rays transmitted by the target relative to the frame of reference (via detector 7, 18 and 90/91),
- d) detecting light from the target relative to the frame of reference (via detector 17), and
- e) providing co-registered electromagnetic ray and light images of the target to a user (Fig.16).

With respect to claims 13 and 19, Asahina further discloses the step of redirecting the light to be detected from the target without redirecting the electromagnetic to be detected from the target (via X-ray transparent mirror 16).

With respect to claims 14 and 20, Asahina further discloses the step of providing excitation light to the target relative to the frame of reference (ambient light in the examination room from room lights, also item 4).

With respect to claims 15 and 21, Asahina further discloses the step of redirecting the excitation light relative to the target without redirecting the electromagnetic rays (via X-ray transparent mirror 6).

With respect to claims 16 and 22, Asahina further discloses the step of capturing X-ray image data and identifying X-ray image data associated with the target (by way of X-ray detector 7, 18 and 90/91).

Claims 12-14, 16, 18-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Bani-Hashemi (US 6,229,873 B1).

Regarding claims 12 and 18, Bani-Hashemi discloses a method and program (Figs.1 and 2), including:

a) defining a frame of reference,

Art Unit: 2882

b) providing electromagnetic rays to a target 10 relative to the frame of reference (via source 32),

c) detecting electromagnetic rays transmitted by the target relative to the frame of reference (via detector 20),

d) detecting light from the target relative to the frame of reference (via detector 42), and

e) providing co-registered electromagnetic ray and light images of the target to a user (Abstract, Fig.2).

With respect to claims 13 and 19, Bani-Hashemi further discloses the step of redirecting the light to be detected from the target without redirecting the electromagnetic to be detected from the target (via X-ray transparent mirror M1).

With respect to claims 14 and 20, Bani-Hashemi further discloses the step of providing excitation light to the target relative to the frame of reference (ambient light in the examination room from room lights).

With respect to claims 16 and 22, Bani-Hashemi further discloses the step of capturing X-ray image data and identifying X-ray image data associated with the target (by way of X-ray detector 20, also see Fig.2).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-7, 9, 10, 15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bani-Hashemi in view of Hollstein (US 2,474,421).

With respect to claims 15 and 21, Bani-Hashemi does not specifically disclose the redirection of excitation light without redirecting the electromagnetic rays, since the excitation light is simply ambient light in the room.

Hollstein specifically teaches the practice of having a source of excitation light 41 with respect to a frame of reference that is redirected to a target (not shown) by mirror 31 (Fig. 1). Hollstein teaches that there are situations where dark, obscure parts of the body need to be imaged/treated, where ambient light is insufficient for proper alignment purposes (col.2, lines 24-45; col.4, lines 39-46). It is not clear, however, whether or not the mirror is transparent to X-rays; that is to say, it is not clear whether Hollstein redirects the excitation light without redirecting the X-ray beam. One skilled in the art, when incorporating the teachings of Hollstein (particularly in col.4, lines 39-46) into that of Bani-Hashemi, the X-ray transparent mirror M1, which already redirects the light from the target to the light detector, performs the same function and has the same alignment as the mirror of Hollstein. Therefore, the placement of the excitation source as taught by Hollstein in the device of Bani-Hashemi would inherently perform the

Art Unit: 2882

function of redirecting the excitation source without redirecting or interfering with the X-ray beam.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to redirect the excitation light relative to the target without redirecting the electromagnetic rays in order to improve the accuracy and precision of alignment/imaging in conditions where the ambient light is insufficient, as taught by Hollstein.

Regarding claim 5, Bani-Hashemi discloses an apparatus (Fig. 1), including:

- a) a source of excitation light (ambient light),
- b) an electromagnetic ray source 32 disposed relative to the source of excitation light,
- c) an electromagnetic ray transparent mirror M1 having a surface disposed toward the electromagnetic ray source,
- d) a target location disposed towards the first surface of the electromagnetic ray transparent mirror for locating a target 10 and receiving the excitation light and the electromagnetic rays,
- e) an electromagnetic ray detector 20 disposed on an opposite side of the target location relative to the electromagnetic ray transparent mirror for detecting electromagnetic rays transmitted through the target,
- f) a second electromagnetic ray transparent mirror M1 having a light reflective surface disposed towards the target location, and
- g) a light detector 42 disposed towards the light reflective surface of the second electromagnetic ray transparent mirror for detecting light from the target.

Bani-Hashemi does not specifically disclose that the electromagnetic ray transparent mirror has a first surface that is disposed towards the excitation light. Since the excitation light is ambient light in the room, the mirror is enclosed within a collective housing with the X-ray source and the light detector.

Hollstein specifically teaches the use of an excitation light source 41, where the light is used for alignment of the X-ray beam and the object to be imaged/treated via a mirror 31 (col.4, lines 38-46). Hollstein teaches that there are situations where dark, obscure parts of the body need to be imaged/treated, where ambient light is insufficient for proper alignment purposes (col.2, lines 24-45). One skilled in the art, when incorporating the teachings of Hollstein (particularly in col.4, lines 39-46) into that of Bani-Hashemi, the X-ray transparent mirror M1, which already redirects the light from the target to the light detector, performs the same function and has the same alignment as the mirror of Hollstein. Therefore, the placement of the excitation source as taught by Hollstein in the device of Bani-Hashemi would inherently perform the function of redirecting the excitation source.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Bani-Hashemi to have the electromagnetic ray transparent mirror with a first surface disposed towards the excitation light in order to improve the accuracy and precision of alignment/imaging in conditions where the ambient light is insufficient, as taught by Hollstein.

With respect to claim 6, Bani-Hashemi further discloses that the electromagnetic ray source emits X-rays.

With respect to claim 7, Bani-Hashemi further discloses that the source of excitation light emits optical light.

With respect to claim 9, the combination of Bani-Hashemi/Hollstein has a mirror M1 disposed towards the excitation light for at least one of reflecting and redirecting the excitation light.

With respect to claim 10, Bani-Hashemi further discloses a mirror M2 disposed towards the light reflective surface of the second electromagnetic ray transparent mirror for at least one of reflecting and redirecting the light from the target to the light detector.

***Allowable Subject Matter***

Claim 1 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 1st paragraph, set forth in this Office action.

Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 17 and 23 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 1st paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither teaches nor reasonably suggests an apparatus that has an excitation light source and an X-ray source and X-ray detector, where:

a) a one-way mirror is arranged with a transmissive side disposed toward the excitation light for transmitting the excitation light and a reflective side for reflecting light from a target, and

b) an X-ray transparent mirror is arranged such that a light-reflective surface is disposed towards the reflecting side of the one-way mirror and an X-ray transmissive surface is disposed towards the X-ray source, and

c) a target is disposed towards the light reflective surface of the X-ray transparent mirror for receiving the excitation light and X-rays, and

d) a light detector disposed toward the reflective side of the one-way mirror for detecting light from the target,

as claimed in the combination of claims 1 and 2.

Claims 3-5 are allowable by virtue of their dependency.

The prior art of record neither teaches nor reasonably suggests the additional limitation that image coordinates of the target are converted to light coordinates which are processed to direct the excitation light to the target, as required by the combination as claimed in each of claims 17 and 23.

*Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Vijverberg (US 4,246,607), Zweig (US 5,590,170), Suuronen (US 6,614,875 B2), Hasegawa (US 6,404,846 B1), Winsor (US 6,869,218 B2) and Goulding (US 5,892,808) all teach devices similar to that of Bani-Hashemi, Ogura and Asahina.

US Patents to Bani-Hashemi (US 6,447,163 B1; US 6,473,489 B2; US 6,227,704 B1) all disclose similar devices to that of Bani-Hashemi cited above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas R. Artman  
Patent Examiner



Craig E. Church  
Primary Examiner